

WEST

 Generate Collection

L2: Entry 4 of 5

File: USPT

Mar 2, 1999

US-PAT-NO: 5876733

DOCUMENT-IDENTIFIER: US 5876733 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: March 2, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A

US-CL-CURRENT: 424/256.1; 424/185.1, 424/193.1, 424/197.11, 530/350, 536/23.1,
536/23.7

CLAIMS:

What I claim is:

1. A conjugate comprising an isolated and purified high molecular weight protein of non-typeable Haemophilus influenzae which is selected from the group consisting of HMW1 encoded by the DNA sequence shown in FIG. 1 (SEQ ID no: 1) having the amino acid sequence shown in FIG. 2 (SEQ ID no: 2) and having an apparent molecular weight of 125 kDa and HMW2 encoded by the DNA sequence shown in FIG. 3 (SEQ ID no: 3) having the derived amino acid sequence of FIG. 4 (SEQ ID n: 4) and having an apparent molecular weight of 120 kDa linked to an antigen, hapten or polysaccharide for eliciting an immune response to said antigen, hapten or polysaccharide.
2. The conjugate as claimed in claim 1 wherein said polysaccharide is a protective polysaccharide against Haemophilus influenzae type b.

ODP

Not
PMW58/469880
6/6/95

C/6/95 102(c)

08/469880

WEST

L2: Entry 4 of 5

File: USPT

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TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: March 2, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
St. Louis University	N/A	N/A	N/A	N/A	02
Washington University	N/A	N/A	N/A	N/A	02

APPL-NO: 8/ 469880

DATE FILED: June 6, 1995

PARENT-CASE:

This is a continuation of application Ser. No. 08/302,832, filed as
PCT/US93/02166 Mar. 16, 1993, now U.S. patent Ser. No. 5,603,938.

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
GB	9205704	March 16, 1992

INT-CL: [6] A61K 39/102

US-CL-ISSUED: 424/256.1; 424/193.1, 424/197.11, 424/185.1, 530/350, 536/23.1,
 536/23.7US-CL-CURRENT: 424/256.1; 424/185.1, 424/193.1, 424/197.11, 530/350, 536/23.1,
536/23.7FIELD-OF-SEARCH: 424/256.1, 424/197.11, 424/193.1, 424/185.1, 530/350, 536/23.1,
 536/23.7

PRIOR-ART-DISCLOSED:

OTHER PUBLICATIONS

Barenkamp et al. 1990. Ped. Infect. Dis. 9(5):333-339.

Barenkamp et al., Abstract 983, Pediatric Research, vol. 27.

Caputa et al., J. Clin. Microbiol., 1991, 29(11):2418-2423.

Scheerson et al. 1984. Infect. Immun. 45(3):582-591.

Barenkamp et al. 1992. Infect. Immun. 60(4):1302-1313.

Pediatric Infectious Disease Journal, vol. 9, No. 5, issued May 1990, S.J.

Barenkamp et al., "Development of Serum Bactericidal Activity Following
 Nontypable Haemophilus influenzae Acute Otitis Media", pp. 333-339, see entire
 document.Journal of Clinical Microbiology, vol. 29, No. 11, issued Nov. 1991, A.C. Caputa
 et al., "110 Kilodalton Recombinant Protein which is Immunoreactive with Sera

from Humans, Dogs, and Horses with Lyme Borreliosis", pp. 2418-2423, see entire document.

Joint Meeting of the American Pediatric Society and the Society for Pediatric Research, 07-10 May 1990, S.J. Barenkamp, "Cloning and Expression of Genes for Nontypable Haemophilus influenzae (NTHI) High Molecular Weight (HMW) Outer Membrane Proteins which are Targets of Bactericidal Antibody", Abstract 983, Pediatric Research, vol. 27, (4 part 2).

The Journal of Infectious Diseases, vol. 165 (Suppl.), issued Aug. 1992, S.J. Barenkamp, "Outer Membrane Protein and Lipopolysaccharides of Nontypeable Haemophilus influenzae", pp. S181-S184, see entire document.

Infection and Immunity, vol. 60(40), issued Apr. 1992, S.J. Barenkamp et al., Cloning, Expression and DNA Sequence Analysis of Genes Encoding Nontypable Haemophilus influenzae High-Molecular-Weight Surface-Exposed Proteins Related to Filamentous Hemagglutinin of Bordetella pertussis pp. 1302-1313, see entire document.

Infection and Immunity, vol. 56(1), issued Jan. 1988, E.J. Hansen, Immune Enhancement of Pulmonary Clearance on Nontypable Haemophilus influenzae, pp. 182-190, see entire document, especially Figures 3 and 4.

Infection and Immunity, vol. 52(2), issued May 1986, S.J. Barenkamp, "Protection by Serum Antibodies in Experimental Nontypable Haemophilus influenzae Otitis Media", pp. 572-578, see Figures 1 and 2.

Proceedings of the National Academy of Sciences USA, vol. 80, issued Mar. 1983, R.A. Young et al, "Efficient Isolation of Genes by Using Antibody Probes", pp. 1194-1198, see entire document.

Infection and Immunity, vol. 45(3), issued Sep. 1984, R. Schneerson et al, "Serum Antibody Responses of Juvenile and Infant Rhesus Monkeys Injected with Haemophilus influenzae Type b and Pneumococcus Type 6A Capsular Polysaccharide-Protein Conjugates", pp. 582-591, see entire document.

Journal of Molecular Biology, vol. 157, issued 1982, J. Kyte et al, "A Simple Method for Displaying the Hydropathic Character of a Protein", pp. 105-132, see entire document.

Proceedings of the National Academy of Sciences, vol. 78(6), issued Jun. 1981, T.P. Hopp et al, "Prediction of Protein Antigenic Determinants from Amino Acid Sequences", pp. 3824-3828, see entire document.

Pediatr. Infect. Dis. J., 9: 333-339, 1990, Stephen J. Barenkamp and Frank F. Bodor, "Development of Serum Bacterial Activity Following Nontypable Haemophilus influenzae Acute Otitis Media".

ART-UNIT: 161

PRIMARY-EXAMINER: Housel; James C.

ASSISTANT-EXAMINER: Shaver; Jennifer

ATTY-AGENT-FIRM: Shoemaker and Mattare, Ltd.

ABSTRACT:

High molecular weight surfaces proteins of non-typeable Haemophilus influenzae which exhibit immunogenic properties and genes encoding the same are described. Specifically, genes coding for two immunodominant high molecular weight proteins, HMW1 and HMW2, have been cloned, expressed and sequenced, while genes coding for high molecular proteins HMW3 and HMW4 have been cloned, expressed and partially sequenced.

2 Claims, 68 Drawing figures

WEST**End of Result Set** **Generate Collection**

L3: Entry 1 of 1

File: USPT

Aug 27, 1996

US-PAT-NO: 5549897DOCUMENT-IDENTIFIER: US 5549897 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: August 27, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A
St. Geme, III; Joseph W.	St. Louis	MO	N/A	N/A

US-CL-CURRENT: 424/256.1; 435/851, 530/350

CLAIMS:

What we claim is:

1. A vaccine against disease caused by non-typeable Haemophilus influenzae, including otitis media, sinusitis and bronchitis, comprising an effective amount of a high molecular weight protein of non-typeable Haemophilus influenzae which is protein HMW1 and/or HMW2 and a physiological carrier therefor.
2. The vaccine of claim 1 wherein said protein is HMW1 encoded by the DNA sequence shown in FIG. 1 (SEQ ID NO:1), having the derived amino acid sequence of FIG. 2 (SEQ_ID_ID_NO:2) and having an apparent molecular weight of 125 kDa.
3. The vaccine of claim 1 wherein said protein is HMW2 encoding by the DNA sequence shown in FIG. 3 SEQ ID NO:3), having the derived amino acid sequence of FIG. 4 SEQ ID NO:4) and having an apparent molecular weight of 120 kDa.

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102(e)
08/038682

WEST**End of Result Set**

Generate Collection

L3: Entry 1 of 1

File: USPT

Aug 27, 1996

US-PAT-NO: 5549897DOCUMENT-IDENTIFIER: US 5549897 A

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DATE-ISSUED: August 27, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A
St. Geme, III; Joseph W.	St. Louis	MO	N/A	N/A

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
St. Louis University	St. Louis	MO	N/A	N/A	02
Washington University	St. Louis	MO	N/A	N/A	02

APPL-NO: 8/ 038682

DATE FILED: March 16, 1993

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
GB	9205704	March 16, 1992

INT-CL: [6] A61K 39/102, A61K 38/16

US-CL-ISSUED: 424/256N; 435/851, 530/350

US-CL-CURRENT: 424/256.1; 435/851, 530/350

FIELD-OF-SEARCH: 424/92, 424/88, 424/256.1, 435/851, 530/350

PRIOR-ART-DISCLOSED:

OTHER PUBLICATIONS

Barenkamp S. J., Pediatr Res 29(4 part 2) 1991 p. 167A Abstract #985.
 Van Regenmortel, Immunology Today 10(8):266-272, 1989.

Dick et al, Contrib Microbiol. Immunol 10:48-114, 1989.

Roitt et al, eds Immunology, C. V. Mosby Co, St. Louis, Gowe-Medical Publishing, London, 1985 pp. 8.3-8.4.

Boslego et al Vaccine 9:154-162, 1991.

Pediatr. Infect. Dis. J., 9:333-339, 1990.

The Journal of Infectious Diseases, vol. 165(Suppl.), issued Aug. 1992, S. J. Barenkamp, "Outer Membrane Protein and Lipopolysaccharides of Nontypeable Haemophilus influenzae", pp. S181-S184, see entire document.

Infection and Immunity, vol. 56(1), issued Jan. 1988, E. J. Hansen, "Immune Enhancement of Pulmonary Clearance on Nontypable Haemophilus influenzae," pp. 182-190, see entire document, especially Figs. 3 and 4.

Infection and Immunity, vol. 60(4), issued Apr. 1992, S. J. Barenkamp et al, "Cloning, Expression and DNA Sequence Analysis of Genes Encoding Nontypeable

"Haemophilus influenzae High -Molecular-Weight Surface-Exposed Proteins Related to Filamentous Hemagglutinin of *Bordetella pertussis*," pp. 1302-1313, see entire document.

Infection and Immunity, vol. 52(2), issued May 1986, S. J. Barenkamp, "Protection by Serum Antibodies in Experimental Nontypable Haemophilus influenzae Otitis Media", pp. 572-578, see Figs. 1 and 2.

Proceedings of the National Academy of Sciences USA, vol. 80, issued Mar. 1983, R. A. Young et al, "Efficient Isolation of Genes by Using Antibody Probes, "pp. 1194-1198, see entire document.

Journal of Molecular Biology, vol. 157, issued 1982, J. Kyte et al, "A Simple Method for Displaying the Hydrophobic Character of a Protein", pp. 105-132, see entire document.

Proceedings of the National Academy of Sciences, vol. 78(6), issued Jun. 1981, T. P. Hopp et al, "Prediction of Protein Antigenic Determinants from Amino Acid Sequences", pp. 3824-3828, see entire document.

Infection and Immunity, vol. 45(3), issued Sep. 1984, R. Schneerson et al, "Serum Antibody Responses of Juvenile and Infant Rhesus Monkeys Injected with Haemophilus influenzae Type b and Pneumococcus Type 6A Capsular Polysaccharide-Protein Conjugates", pp. 582-591, see entire document.

ART-UNIT: 182

PRIMARY-EXAMINER: Housel; James C.

ASSISTANT-EXAMINER: Krsek-Staples; Julie

ATTY-AGENT-FIRM: Shoemaker and Mattare, Ltd.

ABSTRACT:

High molecular weight surface proteins of non-typeable *Haemophilus influenzae* which exhibit immunogenic properties and genes encoding the same are described. Specifically, genes coding for two immunodominant high molecular weight proteins, HMW1 and HMW2, have been cloned, expressed and sequenced, while genes coding for high molecular weight proteins HMW3 and HMW4 have been cloned, expressed and partially sequenced.

3 Claims, 68 Drawing figures

WEST**End of Result Set** **Generate Collection**

LS: Entry 1 of 1

File: USPT

Feb 9, 1999

US-PAT-NO: 5869065DOCUMENT-IDENTIFIER: US 5869065 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: February 9, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A
St. Geme, III; Joseph William	St. Louis	MO	N/A	N/A

US-CL-CURRENT: 424/256.1; 424/185.1, 424/190.1, 530/350, 536/23.1, 536/23.7

CLAIMS:

What we claim is:

1. A vaccine against diseased caused by non-typeable Haemophilus influenza, including otitis media, sinusitis and bronchitis, which comprises a mixture of (1) HMW1 encoded by the DNA sequence shown in FIG. 1 (SEQ ID No:1), having the derived amino acid sequence of FIG. 2 (SEQ ID No:2) and having an apparent molecular weight of 125 kDa and (2) HMW2 encoded by the DNA sequence shown in FIG. 3 (SEQ ID No:3), having the derived amino acid sequence of FIG. 4 (SEQ ID No:4) and having an apparent molecular weight of 120 kDa, and a physiological carrier for said mixture.

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08/530198
12/13/95
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WEST**End of Result Set** **Generate Collection**

L5: Entry 1 of 1

File: USPT

Feb 9, 1999

US-PAT-NO: 5869065DOCUMENT-IDENTIFIER: US 5869065 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: February 9, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A
St. Geme, III; Joseph William	St. Louis	MO	N/A	N/A

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE	CODE
Board of Trustees of the Leland Stanford Junior University	Stanford CA		N/A	N/A	02	

APPL-NO: 8/ 530198

DATE FILED: December 13, 1995

PCT-DATA:

APPL-NO	DATE-FILED	PUB-NO	PUB-DATE	371-DATE	102 (E) -DATE
PCT/US94/02550	March 15, 1994	WO94/21290	Sep 29, 1994	Dec 13, 1995	Dec 13, 1995

INT-CL: [6] A61K 39/102

US-CL-ISSUED: 424/256.1; 424/185.1, 424/190.1, 530/350, 536/23.1, 536/23.7

US-CL-CURRENT: 424/256.1; 424/185.1, 424/190.1, 530/350, 536/23.1, 536/23.7

FIELD-OF-SEARCH: 424/185.1, 424/256.1, 424/190.1, 530/350, 536/23.1, 536/23.7

PRIOR-ART-DISCLOSED:

OTHER PUBLICATIONS

Barenkamp et al. Infection & Immunity Apr. 1992 60(4): pp. 1302-1313.

Barenkamp (Ped. Res. 1991 29(4) pt. 2., 167A, Abstract No. 985).

Barenkamp et al. (Ped. Inf. Dis. J. 1990 9(5):333-339.)

ART-UNIT: 161

PRIMARY-EXAMINER: Housel; James C.

ASSISTANT-EXAMINER: Shaver; Jennifer

ATTY-AGENT-FIRM: Shoemaker and Mattare, Ltd.

ABSTRACT:

High molecular weight surface proteins of non-typeable Haemophilus influenzae which exhibit immunogenic properties and genes encoding the same are described. Specifically, genes coding for two immunodominant high molecular weight proteins, HMW1 and HMW2, have been cloned, expressed and sequenced, while genes

coding for high molecular proteins HMW3 and HMW4 have been cloned, expressed and partially sequenced.

1 Claims, 68 Drawing figures

WEST**Search HMW3****Generate Collection****Search Results - Record(s) 1 through 8 of 8 returned.** 1. Document ID: US 6218141 B1*All
related
cases*

L6: Entry 1 of 8

File: USPT

Apr 17, 2001

US-PAT-NO: 6218141

DOCUMENT-IDENTIFIER: US 6218141 B1

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: April 17, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A

US-CL-CURRENT: 435/69.1; 424/185.1, 424/256.1, 435/69.3, 435/71.1, 435/71.2,
530/350

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KMC	Draw Desc	Image
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 2. Document ID: US 5977336 A

L6: Entry 2 of 8

File: USPT

Nov 2, 1999

US-PAT-NO: 5977336

DOCUMENT-IDENTIFIER: US 5977336 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: November 2, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A

US-CL-CURRENT: 536/23.7; 424/256.1, 435/320.1, 530/350, 536/23.1

Full	Title	Citation	Front	Review	Classification	Date	Reference	KMC	Draw Desc	Image
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 3. Document ID: US 5928651 A

L6: Entry 3 of 8

File: USPT

Jul 27, 1999

US-PAT-NO: 5928651

DOCUMENT-IDENTIFIER: US 5928651 A

TITLE: Gene encoding high molecular surface protein-2 non-typeable haemophilus

DATE-ISSUED: July 27, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A

US-CL-CURRENT: 424/256.1; 424/184.1, 435/69.1, 435/69.3, 536/22.1, 536/23.1,
536/23.7[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#)[KMD](#) | [Draw Desc](#) | [Image](#)

 4. Document ID: US 5876733 A

L6: Entry 4 of 8

File: USPT

Mar 2, 1999

US-PAT-NO: 5876733

DOCUMENT-IDENTIFIER: US 5876733 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: March 2, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A

US-CL-CURRENT: 424/256.1; 424/185.1, 424/193.1, 424/197.11, 530/350, 536/23.1,
536/23.7[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#)[KMD](#) | [Draw Desc](#) | [Image](#)

 5. Document ID: US 5869065 A

L6: Entry 5 of 8

File: USPT

Feb 9, 1999

US-PAT-NO: 5869065

DOCUMENT-IDENTIFIER: US 5869065 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: February 9, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A
St. Geme, III; Joseph William	St. Louis	MO	N/A	N/A

US-CL-CURRENT: 424/256.1; 424/185.1, 424/190.1, 530/350, 536/23.1, 536/23.7

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#)[KMC](#) | [Draw Desc](#) | [Image](#)

 6. Document ID: US 5603938 A

L6: Entry 6 of 8

File: USPT

Feb 18, 1997

US-PAT-NO: 5603938

DOCUMENT-IDENTIFIER: US 5603938 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: February 18, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A

US-CL-CURRENT: 424/256.1; 435/69.1, 435/69.3, 536/22.1, 536/23.1, 536/23.7,
536/24.1[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#)[KMC](#) | [Draw Desc](#) | [Image](#)

 7. Document ID: US 5549897 A

L6: Entry 7 of 8

File: USPT

Aug 27, 1996

US-PAT-NO: 5549897

DOCUMENT-IDENTIFIER: US 5549897 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: August 27, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A
St. Geme, III; Joseph W.	St. Louis	MO	N/A	N/A

US-CL-CURRENT: 424/256.1; 435/851, 530/350[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#)[KMC](#) | [Draw Desc](#) | [Image](#)

 8. Document ID: US 4945041 A

L6: Entry 8 of 8

File: USPT

Jul 31, 1990

US-PAT-NO: 4945041
DOCUMENT-IDENTIFIER: US 4945041 A

TITLE: Monoclonal antibodies for Mycoplasma pneumoniae and use for diagnosis of pneumonia

DATE-ISSUED: July 31, 1990

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Baseman; Joel B.	San Antonio	TX	N/A	N/A

US-CL-CURRENT: 435/7.32; 435/340, 435/452, 435/70.21, 435/948, 436/528, 436/529,
436/548, 530/388.4, 530/808, 530/809, 530/864

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [KMC](#) | [Draw Desc](#) | [Image](#)

[Generate Collection](#)

Terms	Documents
hmw3	8

[Display](#) Documents, starting with Document:

[Display Format:](#) [Change Format](#)

WEST**End of Result Set** **Generate Collection**

L2: Entry 5 of 5

File: USPT

Feb 18, 1997

US-PAT-NO: 5603938
DOCUMENT-IDENTIFIER: US 5603938 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: February 18, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A

US-CL-CURRENT: 424/256.1; 435/69.1, 435/69.3, 536/22.1, 536/23.1, 536/23.7,
536/24.1

CLAIMS:

What I claim is:

1. An isolated and purified gene which encodes a high molecular weight protein having the amino acid sequence of SEQ ID: 2.
2. The gene of claim 1 having the DNA sequence of SEQ ID: 1.
3. The isolated and purified gene cluster of a non-typeable Haemophilus strain comprising the sequence of SEQ ID: 5.

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08/302832

WEST**End of Result Set** [Generate Collection](#)

L2: Entry 5 of 5

File: USPT

Feb 18, 1997

US-PAT-NO: 5603938
DOCUMENT-IDENTIFIER: US 5603938 A

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DATE-ISSUED: February 18, 1997

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NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
St. Louis University	St. Louis	MO	N/A	N/A	02
Washington University	St. Louis	MO	N/A	N/A	02

APPL-NO: 8/ 302832

DATE FILED: October 5, 1994

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
GB	9205704	March 16, 1992

PCT-DATA:

APPL-NO	DATE-FILED	PUB-NO	PUB-DATE	371-DATE	102 (E) -DATE
PCT/US93/02166	March 16, 1993	WO93/19090	Sep 30, 1993	Oct 5, 1994	Oct 5, 1994

INT-CL: [6] A61K 39/102, C07H 19/00, C07H 21/00, C07H 21/02

US-CL-ISSUED: 424/256.1; 536/22.1, 536/23.1, 536/23.7, 536/24.1, 435/69.1, 435/69.3

US-CL-CURRENT: 424/256.1; 435/69.1, 435/69.3, 536/22.1, 536/23.1, 536/23.7, 536/24.1

FIELD-OF-SEARCH: 536/22.1, 536/23.7, 536/231, 536/23.1, 536/24.1, 530/300, 530/350, 435/69.1, 435/69.3, 435/91.1, 424/256.1

PRIOR-ART-DISCLOSED:

OTHER PUBLICATIONS

Pediatric Infectious Disease Journal, vol. 9, No. 5, issued May 1990, S.J. Barenkamp et al., "Development of Serum Bactericidal Activity Following Nontypable Haemophilus influenzae Acute Otitis Media", pp. 333-339, see entire document.

Journal of Clinical Microbiology, vol. 29, No. 11, issued Nov. 1991, A. C. Caputa et al., "110 Kilodalton Recombinant Protein which is Immunoreactive with Sera from Humans, Dogs, and Horses with Lyme Borreliosis", pp. 2416-2423, see entire document.

Joint Meeting of the American Pediatric Society and the Society for Pediatric

Research, 7-10 May 1990, S. J. Barenkamp, "Cloning and Expression of Genes for Nontypable *Haemophilus influenzae* (NTH) High Molecular Weight (HMW) Outer Membrane Proteins which are Targets of Bactericidal Antibody", Abstract 983, Pediatric Research, vol. 27, (4 part 2).

The Journal of Infectious Diseases, vol. 165 (Suppl.), issued Aug 1992, S. J. Barenkamp, "Outer Membrane Protein and Lipopolysaccharides of Nontypeable *Haemophilus influenzae*", pp. S181-S184, see entire document.

Infection and Immunity, vol. 60(4), issued Apr. 1992, S. J. Barenkamp et al., "Cloning Expression and DNA Sequence Analysis of Genes Encoding Nontypable *Haemophilus influenzae* High-Molecular-Weight Surface-Exposed Proteins Related to Filamentous Hemagglutinin of *Bordetella pertussis*" pp. 1302-1313, see entire document.

Infection and Immunity, vol. 56(1), Issued Jan. 1988, E. J. Hansen, "Immune Enhancement of Pulmonary Clearance on Nontypable *Haemophilus influenzae*," pp. 182-190, see entire document, especially FIGS. 3 and 4.

Infection and Immunity, vol. 52(2), issued May 1986, S. J. Barenkamp, "Protection by Serum Antibodies in Experimental Nontypable *Haemophilus influenzae* Otitis Media", pp. 572-578, see FIGS. 1 and 2.

Proceedings of the National Academy of Sciences USA, vol. 80, issued Mar. 1983, R. A. Young et al., "Efficient Isolation of Genes by Using Antibody Probes", pp. 1194-1198, see entire document.

Infection and Immunity, vol. 45(3), issued Sep. 1984, R. Schneerson et al., "Serum Antibody Responses of Juvenile and Infant Rhesus Monkeys Injected with *Haemophilus influenzae* Type b and *Pneumococcus* Type 6A Capsular Polysaccharide-Protein Conjugates", pp. 582-591, see entire document.

Journal of Molecular Biology, vol. 157, issued 1982, J. Kyfe et al., "A Simple Method for Displaying the Hydropathic Character of a Protein", pp. 105-132, see entire document.

Proceedings of the National Academy of Sciences, vol. 78(6), issued Jun. 1981, T. P. Hopp et al. "Prediction of Protein Antigenic Determinants from Amino Acid Sequences", pp. 3824-3828, see entire document.

Pediatr. Infect. Dis. J., 9:333-339, 1990, Stephen J. Barenkamp and Frank F. Bodor, "Development of Serum Bacterial Activity Following Nontypable *Haemophilus influenzae* Acute Otitis Media".

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Thomas et al. Infection & Immunity 58:1909-1913, 1990.

Barenkamp, Pediatric Research vol. 20, N67A, Abstract 985, 1991. ✓

ART-UNIT: 182

PRIMARY-EXAMINER: Sidberry; Hazel F.

ATTY-AGENT-FIRM: Shoemaker and Mattare, Ltd.

ABSTRACT:

High molecular weight surface proteins of non-typeable *Haemophilus influenzae* which exhibit immunogenic properties and genes encoding the same are described. Specifically, genes coding for two immunodominant high molecular weight proteins, HMW1 and HMW2, have been cloned, expressed and sequenced, while genes coding for high molecular weight proteins HMW3 and HMW4 have been cloned, expressed and partially sequenced.

3 Claims, 10 Drawing figures

WEST**End of Result Set** **Generate Collection**

L1: Entry 1 of 1

File: USPT

Nov 2, 1999

US-PAT-NO: 5977336DOCUMENT-IDENTIFIER: US 5977336 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: November 2, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A

US-CL-CURRENT: 536/23.7; 424/256.1, 435/320.1, 530/350, 536/23.1

CLAIMS:

What I claim is:

1. An isolated and purified nucleic acid molecule encoding a high molecular weight protein (HMW) of a non-typeable Haemophilus strain and having an apparent molecular weight of about 120 to about 130 kDa having the DNA sequence shown in FIG. 8 (SEQ ID No: 7) and encoding protein HMW3 having the derived amino acid sequence of FIG. 10 (SEQ ID No: 9).
2. An isolated and purified nucleic acid molecule encoding a high molecular weight protein (HMW) of a non-typeable Haemophilus strain and having an apparent molecular weight of about 120 to about 130 kDa having the DNA sequence shown in FIG. 9 (SEQ ID No: 8) and encoding protein HMW4 having the derived amino acid sequence of FIG. 10 (SEQ ID No: 10).
3. An isolated and purified nucleic acid molecule encoding a high molecular weight protein (HMW) of a non-typeable Haemophilus strain and having an apparent molecular weight of about 120 to about 130 kDa and having a DNA sequence selected from the group consisting of:
 - (a) a contiguous DNA sequence as shown in FIGS. 8 and 9 (SEQ ID Nos: 7 and 8); and
 - (b) a contiguous DNA sequence encoding an amino acid sequence as shown in FIG. 10 (SEQ ID Nos: 9 and 10).
4. A vector for transformation of a host comprising the nucleic acid molecule of claims 1,2 or 3.

*This document contains 20X
prior art*

WEST**End of Result Set**

L1: Entry 1 of 1

File: USPT

Nov 2, 1999

US-PAT-NO: 5977336

DOCUMENT-IDENTIFIER: US 5977336 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: November 2, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
St. Louis University	St. Louis	MO	N/A	N/A	02
Washington University	St. Louis	MO	N/A	N/A	02

APPL-NO: 8/ 617697

DATE FILED: April 1, 1996

PARENT-CASE:

REFERENCE TO RELATED APPLICATION This application is a continuation-in-part of U.S. patent application Ser. No. 08/302,832 filed Oct. 5, 1994, now U.S. Pat. No. 5,603,938, which is a continuation of PCT/US93/02166 filed Mar. 16, 1993.

INT-CL: [6] C07H 21/04

US-CL-ISSUED: 536/23.7; 424/256.1, 536/23.1, 435/320.1, 530/350

US-CL-CURRENT: 536/23.7; 424/256.1, 435/320.1, 530/350, 536/23.1

FIELD-OF-SEARCH: 424/256.1, 536/23.1, 536/23.7, 435/320.1, 530/350

PRIOR-ART-DISCLOSED:

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<input type="checkbox"/> <u>4258029</u>	March 1981	Moloney et al.	424/88
<input type="checkbox"/> <u>4855283</u>	August 1989	Lockhoff et al.	424/278
<input type="checkbox"/> <u>4952496</u>	August 1990	Studier et al..	435/91
<input type="checkbox"/> <u>5194254</u>	March 1993	Barber et al.	424/70

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 FOREIGN-PAT-NO
 WO 92/17167

 PUBN-DATE
 October 1992

 COUNTRY
 WOX

US-CL

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Young et al, *PNAS* 80: 1194-1198, 1983.
Houghten et al. *Vaccine* 86, pp. 21-25.
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Barenkamp et al. Apr. 1992. *Infect & Immun.* 60(4) : 1302-1313.
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Barenkamp. *Ped. Res.* May 1990. 27(4 Pt 2). Abstract 983.

ART-UNIT: 161

PRIMARY-EXAMINER: Housel; James C.

ASSISTANT-EXAMINER: Shaver; Jennifer

ATTY-AGENT-FIRM: Shoemaker and Mattare, Ltd

ABSTRACT:

High molecular weight surface proteins of non-typeable *Haemophilus influenzae* which exhibit immunogenic properties and genes encoding the same are described. Specifically, genes coding for two immunodominant high molecular weight proteins, HMW1 and HMW2, have been cloned, expressed and sequenced, while genes coding for high molecular weight proteins HMW3 and HMW4 have also been cloned, expressed and sequenced.

4 Claims, 81 Drawing figures

WEST

L2: Entry 3 of 5

File: USPT

Jul 27, 1999

US-PAT-NO: 5928651

DOCUMENT-IDENTIFIER: US 5928651 A

TITLE: Gene encoding high molecular surface protein-2 non-typeable haemophilus

DATE-ISSUED: July 27, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A

US-CL-CURRENT: 424/256.1; 424/184.1, 435/69.1, 435/69.3, 536/22.1, 536/23.1,
536/23.7

CLAIMS:

What I claim is:

1. An isolated and purified gene which encodes a high molecular weight protein having the amino acid sequence of SEQ ID NO: 4.
2. The gene of claim 1 having the DNA sequence of SEQ ID NO: 3.
3. An isolated and purified gene cluster of a non-typeable Haemophilus strain comprising the sequence of SEQ ID NO: 6.

WEST

L2: Entry 2 of 5

File: USPT

Nov 2, 1999

US-PAT-NO: 5977336

DOCUMENT-IDENTIFIER: US 5977336 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: November 2, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
St. Louis University	St. Louis	MO	N/A	N/A	02
Washington University	St. Louis	MO	N/A	N/A	02

APPL-NO: 8/ 617697

DATE FILED: April 1, 1996

PARENT-CASE:

REFERENCE TO RELATED APPLICATION This application is a continuation-in-part of U.S. patent application Ser. No. 08/302,832 filed Oct. 5, 1994, now U.S. Pat. No. 5,603,938, which is a continuation of PCT/US93/02166 filed Mar. 16, 1993.

INT-CL: [6] C07H 21/04

US-CL-ISSUED: 536/23.7; 424/256.1, 536/23.1, 435/320.1, 530/350

US-CL-CURRENT: 536/23.7; 424/256.1, 435/320.1, 530/350, 536/23.1

FIELD-OF-SEARCH: 424/256.1, 536/23.1, 536/23.7, 435/320.1, 530/350

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<input type="checkbox"/> <u>4258029</u>	March 1981	Moloney et al.	424/88
<input type="checkbox"/> <u>4855283</u>	August 1989	Lockhoff et al.	424/278
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<input type="checkbox"/> <u>5194254</u>	March 1993	Barber et al.	424/70

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FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
WO 92/17167	October 1992	WOX	

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- Weismuller K-H, et al. (1989) Novel low molecular weight synthetic vaccine against foot-and-mouth disease containing a potent B-cell and macrophage activator, *Vaccine* vol. 7, Feb. 1989, pp. 29-33.
- Chang et al., (1978) *Nature* 275:617-624.
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ART-UNIT: 161

PRIMARY-EXAMINER: Housel; James C.

ASSISTANT-EXAMINER: Shaver; Jennifer

ATTY-AGENT-FIRM: Shoemaker and Mattare, Ltd

ABSTRACT:

High molecular weight surface proteins of non-typeable *Haemophilus influenzae* which exhibit immunogenic properties and genes encoding the same are described. Specifically, genes coding for two immunodominant high molecular weight proteins, HMW1 and HMW2, have been cloned, expressed and sequenced, while genes coding for high molecular weight proteins HMW3 and HMW4 have also been cloned, expressed and sequenced.

4 Claims, 81 Drawing figures

WEST

L2: Entry 1 of 5

File: USPT

Apr 17, 2001

US-PAT-NO: 6218141

DOCUMENT-IDENTIFIER: US 6218141 B1

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: April 17, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO	N/A	N/A

US-CL-CURRENT: 435/69.1; 424/185.1, 424/256.1, 435/69.3, 435/71.1, 435/71.2,
530/350

CLAIMS:

What I claim is:

1. A method for the production of an isolated and purified high molecular weight protein of non-typeable Haemophilus which is HMW1, encoded by a DNA sequence having the nucleic acid sequence recited in SEQ ID No: 1 and having an apparent molecular weight of about 125 kDa, which comprises: assembling an expression vector containing the nucleic acid sequence recited in SEQ ID No: 1 which encodes the high molecular weight protein, HMW1, and a promoter operatively coupled to said nucleic acid sequence of SEQ ID No: 1 transforming a host cell with the expression vector, expressing the HMW1 protein in the host cell, and isolating and purifying the expressed HMW1 protein.
2. The method of claim 1 wherein said HMW1 protein has the amino acid sequence as set forth in SEQ ID NO:2.

WEST

L2: Entry 1 of 5

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ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
St. Louis University	St. Louis	MO	N/A	N/A	02
Washington University	St. Louis	MO	N/A	N/A	02

APPL-NO: 8/ 719641

DATE FILED: September 25, 1996

PARENT-CASE:

This is a division of application Ser. No. 08/302,832 filed Oct. 5, 1994, now U.S. Pat. No. 5,603,938 the national phase of International Application No. PCT/US93/02166, filed Mar. 16, 1993 which claims priority to GB 9205704.1 filed Mar. 16, 1992.

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
GB	9205704	March 16, 1992

INT-CL: [7] C12P 21/06

US-CL-ISSUED: 435/69.1; 435/69.3, 435/71.1, 435/71.2, 530/350, 424/185.1, 424/256.1

US-CL-CURRENT: 435/69.1; 424/185.1, 424/256.1, 435/69.3, 435/71.1, 435/71.2, 530/350

FIELD-OF-SEARCH: 424/256.1, 424/197.11, 424/185.1, 530/350, 435/69.3, 435/69.1, 435/69.7, 435/71.1, 435/71.2

PRIOR-ART-DISCLOSED:

U. S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<input type="checkbox"/> 6013514	January 2000	Chong et al.	N/A

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Thomas et al, Infection and Immunity, 58: 1909-1913, 1990.

Barenkamp, Pediatric Research vol. 29, 167A, Abstract 985, 1991.

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ART-UNIT: 165

PRIMARY-EXAMINER: Graser; Jennifer

ATTY-AGENT-FIRM: Shoemaker and Mattare, Ltd.

ABSTRACT:

High molecular weight surface proteins of non-typeable *Haemophilus influenzae* which exhibit immunogenic properties and genes encoding the same are described. Specifically, genes coding for two immudominant high molecular weight proteins, HMW1 and HMW2, have been cloned, expressed and sequenced, while genes coding for high molecular proteins HMW3 and HMW4 have been cloned, expressed and partially sequenced.

2 Claims, 68 Drawing figures